

REMARKS

Claims 1 through 16, 19 through 24, 26 through 41, and 44 through 49 are currently pending in the application.

This amendment is in response to the Final Rejection of the pending claims in the Office Action of September 20, 2006.

35 U.S.C. § 103(a) Obviousness Rejections

Obviousness Rejection Based on Yamada et al. (U.S. Patent 5,864,178) in view of Plueddemann (U.S. Patent 4,231,910)

Claims 1 through 16, 19 through 24, 26 through 41, and 44 through 49 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamada et al. (U.S. Patent 5,864,178) in view of Plueddemann (U.S. Patent 4,231,910). Applicant respectfully traverses this rejection, as hereinafter set forth.

Applicant further submits that to establish a *prima facie* case of obviousness under 35 U.S.C. § 103 three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Third, the cited prior art reference must teach or suggest all of the claim limitations. Furthermore, the suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on Applicant's disclosure.

After carefully considering the cited prior art, the rejections, and the Examiner's comments, Applicant had amended the claimed invention to clearly distinguish over the cited prior art.

Turning to the cited prior art Yamada et al. reference, teaches or suggests a semiconductor device comprising a wiring circuit board and a semiconductor chip mounted through a bump electrode on the circuit board, a space between the circuit board and the semiconductor chip as well as a periphery of the semiconductor chip being encapsulated with a resin containing filler. In FIGS. 56A through 56D a semiconductor chip 201 is mounted on a

wiring circuit board 202 using bumps 203 with the semiconductor chip 201 having a layer of a first resin 204 constituting a laminate of encapsulation resin, a second layer of resin 205 on the wiring circuit board 202 constituting a laminate of encapsulation resin, a third encapsulation resin 206 constituting a laminate of encapsulation resin applied to a portion of the second layer of resin 205, a polymer film 207 formed on the semiconductor chip 201, and a polymer film 208 formed on the wiring circuit board 202. A passivation film 223 is formed on polymer film 208 which is excellent in wettability with the encapsulation resin, such as a hydrocarbon wax, a fatty acid type wax, a fatty amide type wax or an ester type wax. For example, an ester type wax such as carnauba wax or montan wax is preferable in view of their excellent moisture resistance. Other examples useful in Example VIII are a long chain carboxylic acid or a metal salt thereof, such as stearic acid, palmitic acid, zinc stearate and calcium stearate; and a low molecular polyethylene wax which may be applied singly or in combination thereof. Nowhere does Yamada et al. teach or suggest a semiconductor chip 201 having at least a portion of said active surface having a wetting agent layer of about a monolayer thick thereon, said wetting agent layer wettable by a polymeric material. At best, Yamada et al. describe that solely the first layer of encapsulation resin 204, second layer of encapsulation resin 205, and third encapsulation resin 206 may include a silane coupling agent therein mixed with the other components forming the layer of encapsulation resin. The silane coupling agent is only used in the formulation of the encapsulation resin itself, not separately applied to either the semiconductor chip or the wiring circuit board as a wetting agent layer. Nowhere in the Yamada et al. reference is there any description whatsoever directed to any of the encapsulation resins 204, 205, and 206 acting as a wetting agent under any circumstances.

Plueddemann teaches a primer composition for improving adhesion between a solid substrate and a thermosetting resins. In the description of the invention, the composition consists essentially of 1 to 25 weight percent of an organosilicon compound selected from a group of silane compounds or partial hydrolyzates thereof and 75 to 99 weight percent of an alkoxymethyltriazine (see col. 2, lines 5-17). Plueddemann teaches an improved wet and dry adhesion of thermoplastics to solid substrates. (see col. 3, lines 22-24). The primer compound of

Plueddemann is not directed to improved flow of an underfill material. Plueddemann does not teach or suggest the use of a wetting agent whatsoever.

Applicant asserts that in interpreting and applying any prior art in any rejection, the words of the claimed invention must be given their plain meaning unless the plain meaning is inconsistent with the specification. *In re Zletz*, 893 F.2d 319, 13 USPQ2d 1320 (Fed. Cir. 1989) MPEP § 2111.01

Applicant asserts that all words in a claim must be considered in judging the patentability of that claim against the prior art. *In re Wison*, 424 F.2d 1382, 165 USPQ 494 (CCPA 1970)

Applicant asserts that nowhere in the specification of the present application is there a definition for the word “solely” which sets forth any meaning thereof different than the plain meaning of the word “solely”. Applicant asserts that no where in any Office Action is there a definition for the word “solely” which sets forth any meaning thereof different than the plain meaning thereof. Applicant asserts that the plain meaning of the word “solely” precludes the inclusion of other materials in the claim limitation “of solely a silane-based material having no other material therein”. The Applicant having added language to clearly set forth that the material does not include other materials therein.

Applicant asserts that any rejection of the claimed inventions set forth in presently amended independent claims 1, 6, 10, 14, 20, 23, 26, 31, 35, 39, 45, and 48 cannot exclude the word “solely” for any purposes of any rejection of such claims. Applicant further asserts that the plain meaning of the word “solely” must be used to determine if any cited prior art or any combination of cited prior art teaches or suggests such a claim limitation to establish a *prima facie* case of obviousness regarding the claimed inventions of presently amended independent claims 1, 6, 10, 14, 20, 23, 26, 31, 35, 39, 45, and 48.

Applicant asserts that neither the Yamada et al. reference, nor the Plueddemann reference, nor any combination of the Yamada et al. reference and the Plueddemann reference can establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed inventions of presently amended independent claims 1, 6, 10, 14, 20, 23, 26, 31, 35, 39, 45, and 48 because any such prior art taken either individually or in any combination fails to teach or suggest the claim limitation “of solely a silane-based material having no other material therein”. Applicant asserts

that the Yamada et al. reference teaches or suggests a passivation film 223 is formed on polymer film 208 which is excellent in wettability with the encapsulation resin, such as a hydrocarbon wax, a fatty acid type wax, a fatty amide type wax or an ester type wax. Applicant asserts that the Plueddemann reference teaches or suggests a composition consisting essentially of 1 to 25 weight percent of an organosilicon compound selected from a group of silane compounds or partial hydrolyzates thereof and 75 to 99 weight percent of an alkoxymethyltriazine (see col. 2, lines 5-17). Plueddemann teaches an improved wet and dry adhesion of thermoplastics to solid substrates. (see col. 3, lines 22-24). The primer compound of Plueddemann is not directed to improved flow of an underfill material. Plueddemann does not teach or suggest the use of a wetting agent whatsoever. Applicant asserts that neither the Yamada et al. reference, nor the Plueddemann reference, nor any combination of the Yamada et al. reference and the Plueddemann reference teaches or suggests the claim limitations of presently amended independent claims 1, 6, 10, 14, 20, 23, 26, 31, 35, 39, 45, and 48 calling for “of solely a silane-based material having no other material therein”. Applicant asserts that there is no main meaning of the words of the claim limitation of “of solely a silane-based material having no other material therein” for the combination of the cited prior art to teach or suggest any such claim limitations. Applicant asserts that there is no plain meaning for the teaching or suggestion of the Yamada et al. reference “a hydrocarbon wax, a fatty acid type wax, a fatty amide type wax or an ester type wax” to be construed as “of solely a silane-based material having no other material therein”. Applicant further asserts that there is no plain meaning for the teaching or suggestion of the Pluedemann reference “a composition consisting essentially of 1 to 25 weight percent of an organosilicon compound selected from a group of silane compounds or partial hydrolyzates thereof and 75 to 99 weight percent of an alkoxymethyltriazine” to be construed as as “of solely a silane-based material having no other material therein”. Applicant asserts that there is no plain meaning for any teaching or suggestion of the Yamada et al. reference “a hydrocarbon wax, a fatty acid type wax, a fatty amide type wax or an ester type wax” and the Pluedemann reference “a composition consisting essentially of 1 to 25 weight percent of an organosilicon compound selected from a group of silane compounds or partial hydrolyzates thereof and 75 to 99 weight percent of an alkoxymethyltriazine” to be construed as as “of solely a silane-based material

having no other material therein” to establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed inventions of presently amended independent claims 1, 6, 10, 14, 20, 23, 26, 31, 35, 39, 45, and 48. Therefore, presently amended independent claims 1, 6, 10, 14, 20, 23, 26, 31, 35, 39, 45, and 48 as well as the dependent claims therefrom are allowable.

Further, Applicant again asserts that the any combination of the Yamada et al. reference and the Plueddemann reference does not teach or suggest the claim limitations of the claimed inventions set forth in independent claims 1, 6, 10, 14, 20, 23, 26, 31, 35, 39, 45, and 48 calling for “the semiconductor device having an active surface, at least a portion of said active surface having a wetting agent layer of about a monolayer thickness thereon comprising a layer of solely a silane-based material having no other material therein which undergoes no substantial degradation thereof during a curing process for a material”, “a wetting agent layer provided on said active surface of said semiconductor device, said wetting agent layer having a thickness of about a monolayer comprising a layer of solely a silane-based material having no other material therein which undergoes no substantial degradation thereof during a curing process for a material”, “a wetting agent located on a portion of said active surface of said semiconductor device comprising a layer of solely a silane-based material having no other material therein which undergoes no substantial degradation thereof during a curing process for a material”, “a wetting agent layer provided on at least a portion of said active surface of said semiconductor device comprising a layer of solely a silane-based material having no other material therein which undergoes no substantial degradation thereof during a curing process for a material, the underfill material essentially filling a volume between said wetting agent layer and said upper surface of said substrate”, “a wetting agent layer provided on a portion of said active surface of said semiconductor device and a portion of said upper surface of said substrate, said wetting agent layer comprising a layer of solely a silane-based material having no other material therein which undergoes no substantial degradation thereof during a curing process for a material”, “a wetting agent layer provided on said active surface of said semiconductor device and on said upper surface of said substrate, said wetting agent layer comprising a layer of solely a silane-based material having no other material therein which undergoes no substantial degradation thereof during a curing process for a material”, “the semiconductor die having an active surface,

at least a portion of said active surface having a wetting agent layer of about a monolayer in thickness thereon, said wetting agent layer wettable by a polymeric material, said wetting agent layer comprising a layer of solely a silane-based material having no other material therein which undergoes no substantial degradation thereof during a curing process for a material”, “a wetting agent layer provided on said active surface of said semiconductor die, said wetting agent layer having a thickness of about a monolayer and wettable by a polymeric material, said wetting agent layer comprising a layer of solely a silane-based material having no other material therein which undergoes no substantial degradation thereof during a curing process for a material”, “a wetting agent layer provided on a portion of said active surface of said semiconductor die and a portion of said upper surface of said substrate, said wetting agent layer comprising a layer of solely a silane-based material having no other material therein which undergoes no substantial degradation thereof during a curing process for a material”, and “a wetting agent layer provided on said active surface of said semiconductor die and on said upper surface of said substrate, said wetting agent layer comprising a layer of solely a silane-based material having no other material therein which undergoes no substantial degradation thereof during a curing process for a material”.

In contrast to the claimed inventions, Applicant asserts that nowhere does the combination of the Yamada et al. reference and the Plueddemann reference teaches or suggests a wetting agent used on a portion of a semiconductor device, semiconductor die, or substrate in any manner. At best, the Yamada et al. reference discusses the use of silane coupling agent mixed with the other components forming the layer of encapsulation resin. The silane coupling agent is only used in the formulation of the encapsulation resin itself, not separately applied to either the semiconductor chip or the wiring circuit board. At best, the Plueddemann reference teaches or suggests the use a primer composition for improving adhesion between a solid substrate and thermosetting resins. There is no teaching or suggestion whatsoever in the Plueddemann reference regarding the use of the primer composition as a wetting agent. Applicants assert that the Plueddemann reference contains no teaching or suggestion whatsoever for the use of the primer agent with an encapsulation layer such as contained in the Yamada et al. reference. The claimed inventions of independent claims 1, 6, 10, 14, 20, 23, 25, 31, 25, 39, 45, and 48 are not

directed to the use of a silane coupling agent in the formulation of an encapsulation resin or a primer agent applied to the surface of an encapsulation resin containing a silane coupling agent in the formulation thereof. Therefore, any combination of the Yamada et al. reference and the Plueddemann reference cannot and does establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed inventions of independent claims 1, 6, 10, 14, 20, 23, 26, 31, 35, 39, 45, and 48. Accordingly, independent claims 1, 6, 10, 14, 20, 23, 25, 31, 25, 39, 45, and 48 are allowable as well as the dependent claims therefrom.

Further, Applicant asserts that any combination of the Yamada et al. reference and the Plueddemann reference is a hindsight reconstruction of the Applicant's claimed inventions by picking and choosing among the cited prior art based solely upon Applicant's disclosure because the cited prior art fails to suggest any reason for any combination thereof and, even if combined, does not teach or suggest the claimed inventions of independent claims 1, 6, 10, 14, 20, 23, 25, 31, 25, 39, 45, and 48. Such hindsight is evidenced by the attempted modification of the Yamada et al. reference to include the use of a primer agent for adhesion purposes. The Yamada et al. reference needs no primer agent for adhesion purposes and does not teach or suggest the use of one in any manner. Therefore, any combination of the Yamada et al. reference and the Plueddemann reference cannot and does establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed inventions of independent claims 1, 6, 10, 14, 20, 23, 26, 31, 35, 39, 45, and 48. Accordingly, independent claims 1, 6, 10, 14, 20, 23, 25, 31, 25, 39, 45, and 48 are allowable as well as the dependent claims therefrom.

Applicant requests entry of this amendment for the following reasons:

The amendment is timely filed.

The amendment places the application in condition for allowance.

The amendment does not require any further search or consideration.

In summary, Applicant submits that claims 1 through 16, 19 through 24, 26 through 41, and 44 through 49 are clearly allowable over the cited prior art.

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Applicant requests the entry of this amendment, the allowance of claims 1 through 16, 19 through 24, 26 through 41, and 44 through 49, and the case passed for issue.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "James R. Duzan".

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